

Study of Exclusive Dijet Events Using DPE Trigger Data

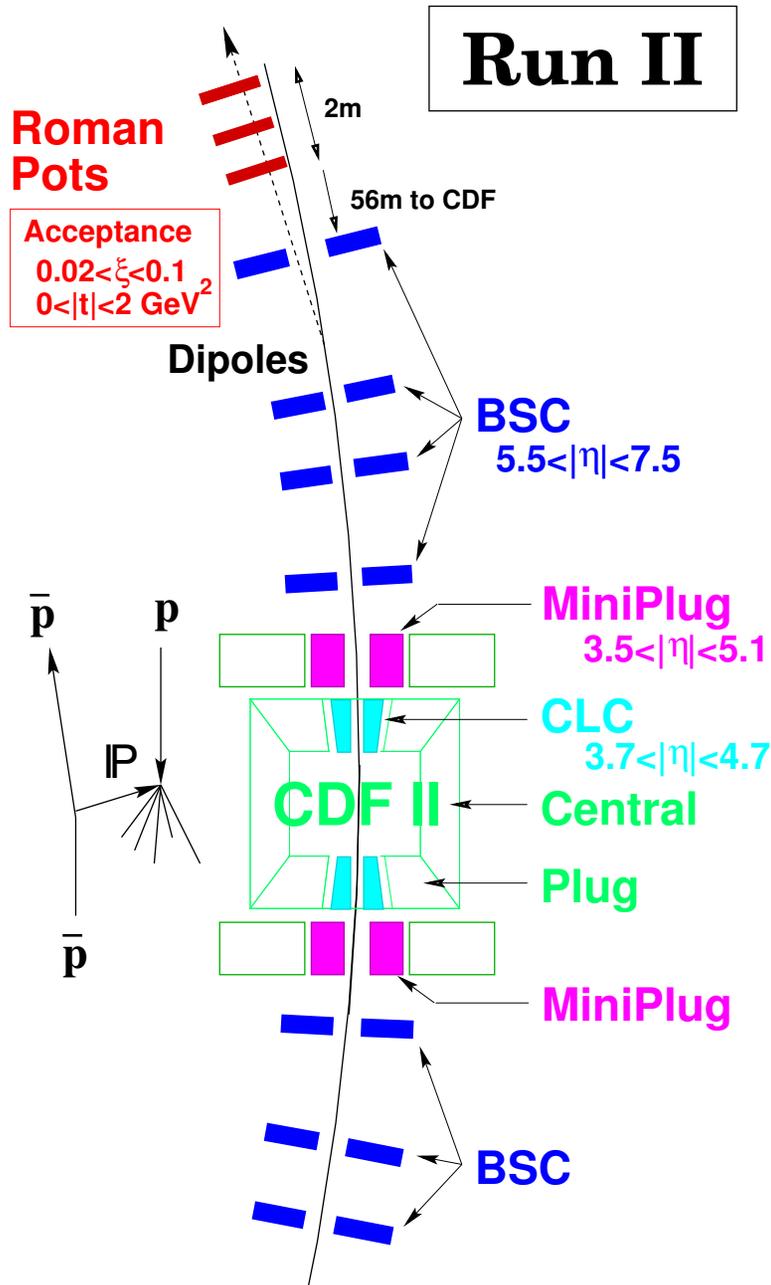
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Nothing is changed in plots/numbers since preblessing

We would like to ask blessing for event displays of DPE dijet candidates, which were not presented at the preblessing talk.

Trigger

Run II



Used in main analysis:

"Dedicated DPE" trigger

- **DPE = RP + SingleTower 5GeV + BSC-East Gap**

Control Sample:

- **SD = RP + SingleTower 5GeV**
- **ND = SingleTower 5GeV**

Run 151683~155821 (DPE, SD) : $25.7 \pm 1.5 \text{ pb}^{-1}$

Run 152123~152949 (ND) : $6.1 \pm 0.4 \text{ pb}^{-1}$

Data	L1	L2	L3
DPE	RP+ST5+Egap: PS1	PS5	AUTO
SD	RP+ST5: PS1	PS100*	AUTO
ND	ST5: PS20	PS300	AUTO

*100 (~1_03-v1) \rightarrow 1000 (1_03-v2~)

Data Selection

<u>Cuts</u>	<u>DPE</u>	<u>SD</u>	<u>ND</u>
Triggered Events	397K	356K	278K
$N_{\text{vertex}}(Q12) \leq 1$	365K	205K	196K
$ Z_{\text{vertex}} < 60\text{cm}$	347K	195K	186K
MET significance < 6	347K	195K	186K
BSC offline cut (GAP)	317K	N/A	N/A
RP offline cut (RP-Hit)	309K	193K	N/A
$N_{\text{jets}}(R=0.7) \geq 2$	204K	158K	160K
$ \eta_{\text{det}}^{\text{jet1,2}} < 2.5$	163K	122K	123K
$E_{\text{t}}^{\text{jet2}}(\text{corr}) > 10 \text{ GeV}$	116,473	93,567	85,038
$0.01 < \xi_{\text{p}}^{\text{X}} < 0.1$	54,552	14,956	N/A
MP-East $N_{\text{hit}} = 0$	17,101	N/A	N/A

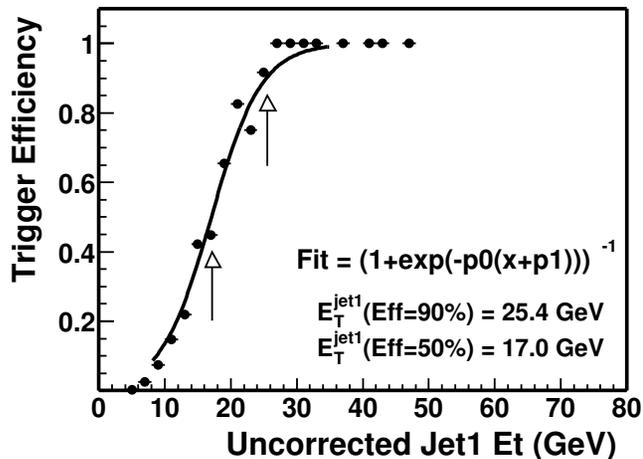
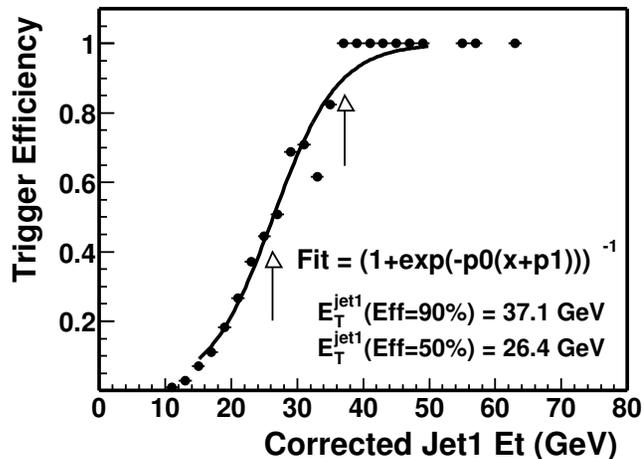
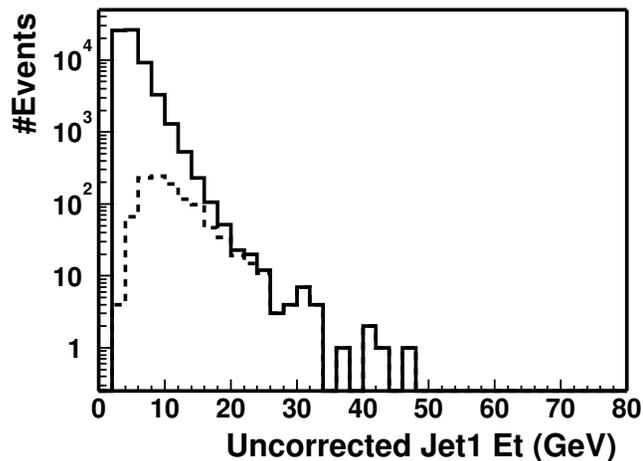
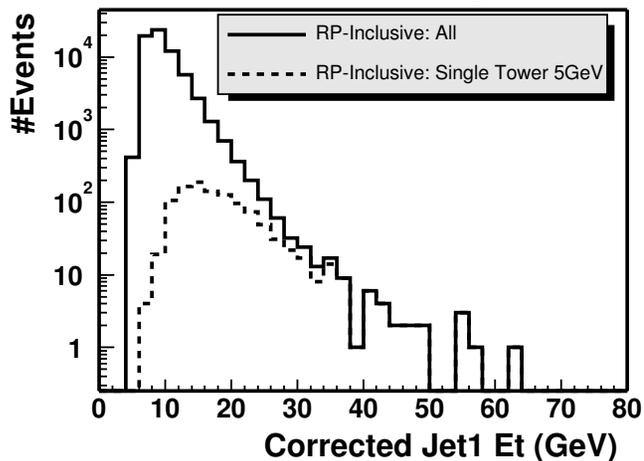
Jet energy correction: Level 7 (all corrections)

UE correction of jets: DPE (0.37GeV), SD (0.54GeV) = Run I values (CDF-4716)
 ND (1.56 GeV) = default Run II value

Trigger Efficiency

To be blessed

CDF Run II Preliminary



Trigger Efficiency vs
Leading Jet E_T intervals:

E_{T1}^{min}	E_{T1}^{max}	$\epsilon(\Delta E_{T1})$
10	15	$5.77 \pm 0.29\%$
15	20	$14.4 \pm 0.7\%$
20	25	$31.6 \pm 1.6\%$
25	35	$66.6 \pm 3.3\%$
35	50	$95.1 \pm 4.8\%$
50	110	$100_{-5}^{+0}\%$

($\pm 5\%$ error assigned)

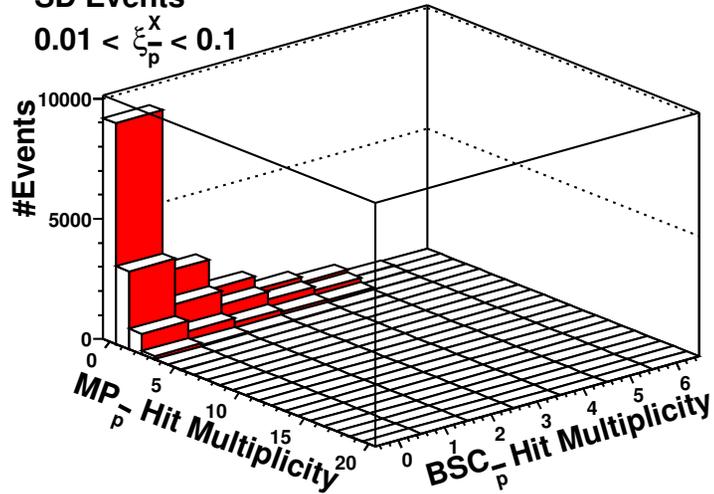
DPE Signal in SD Data

To be blessed

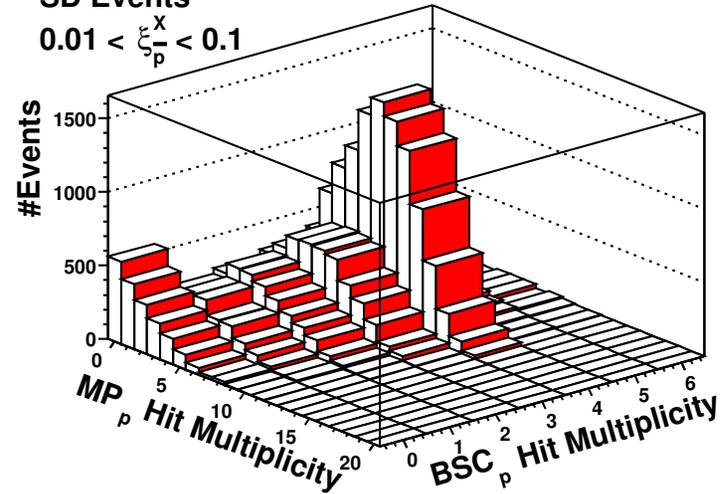
RP+Jet5

CDF Run II Preliminary

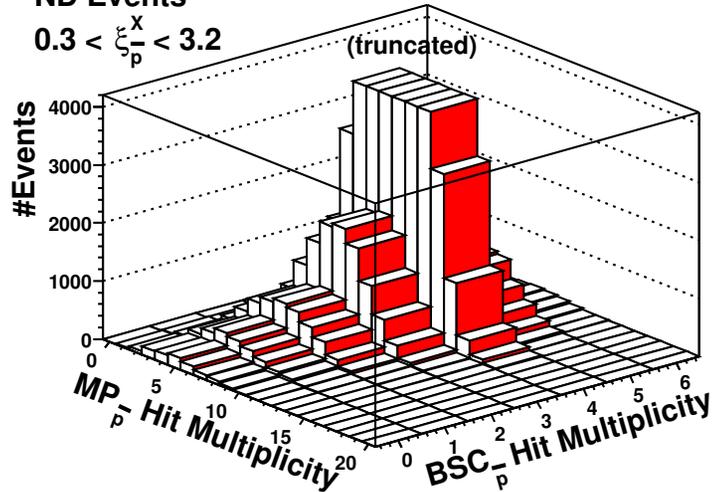
SD Events
 $0.01 < \xi_p^X < 0.1$



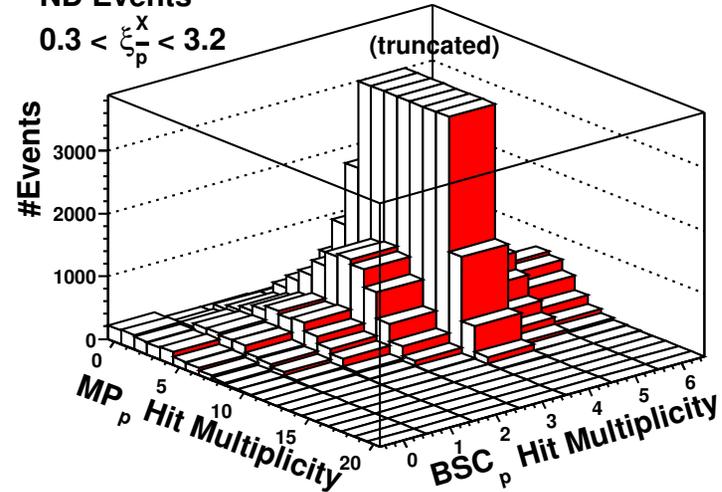
SD Events
 $0.01 < \xi_p^X < 0.1$



ND Events
 $0.3 < \xi_p^X < 3.2$



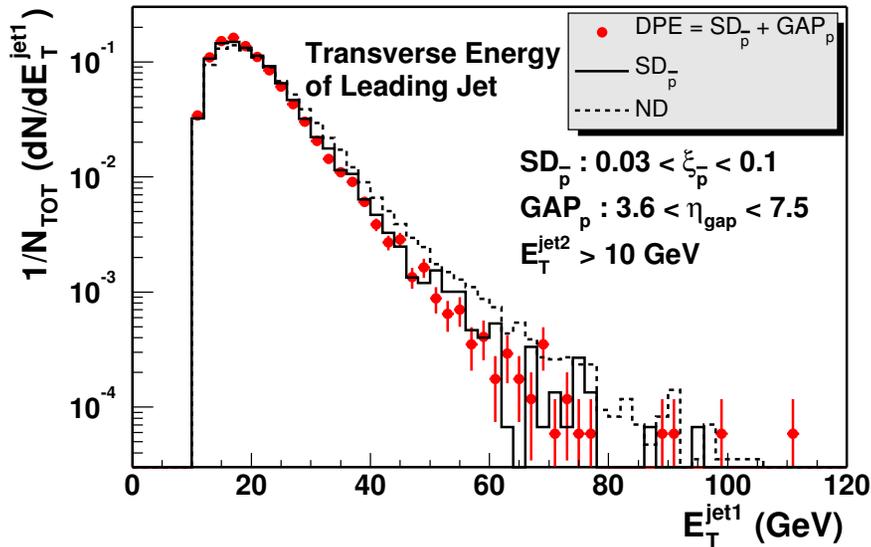
ND Events
 $0.3 < \xi_p^X < 3.2$



Kinematic Distribution of Jets

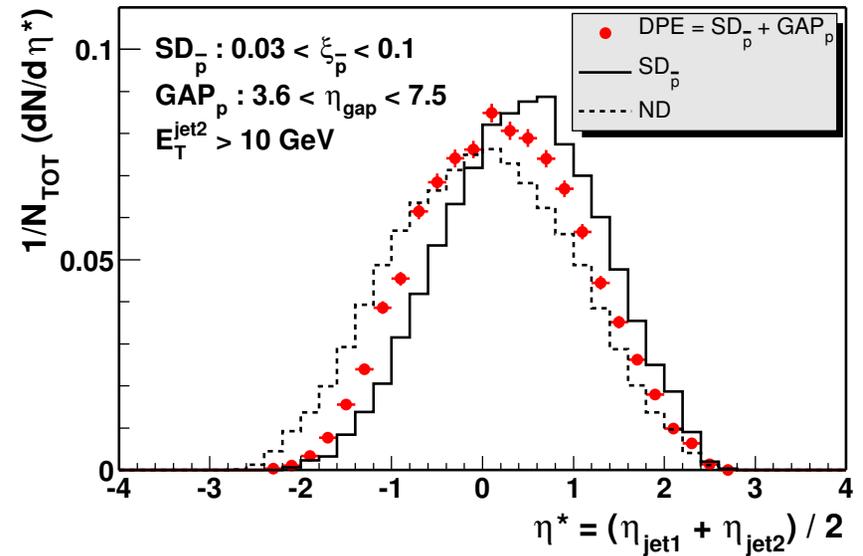
To be blessed

CDF Run II Preliminary

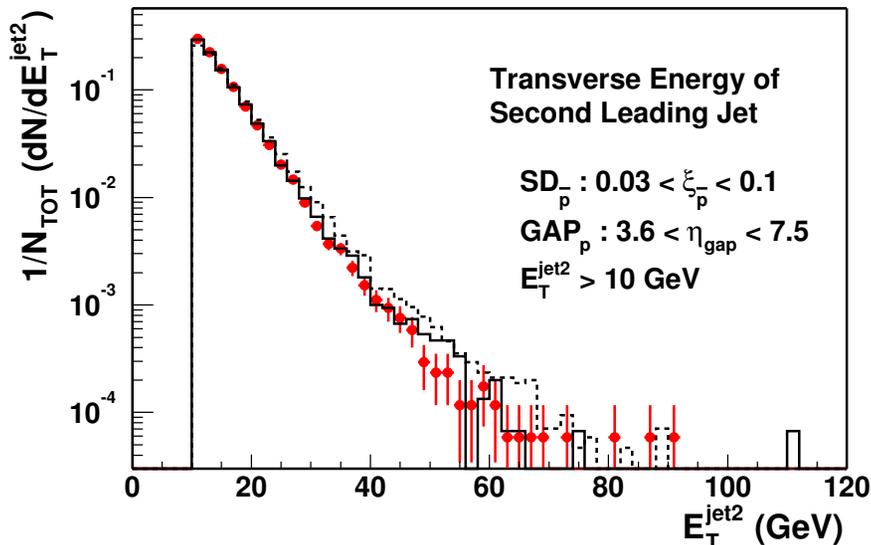


To be blessed

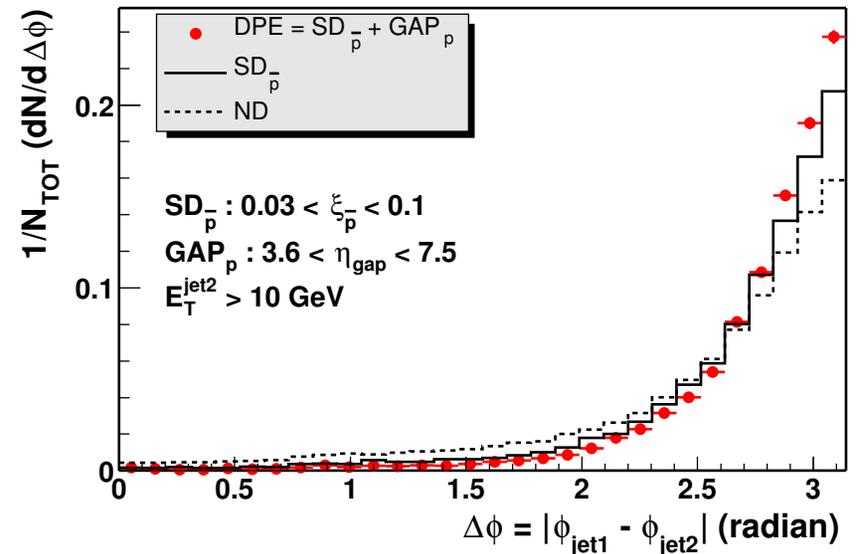
CDF Run II Preliminary



CDF Run II Preliminary



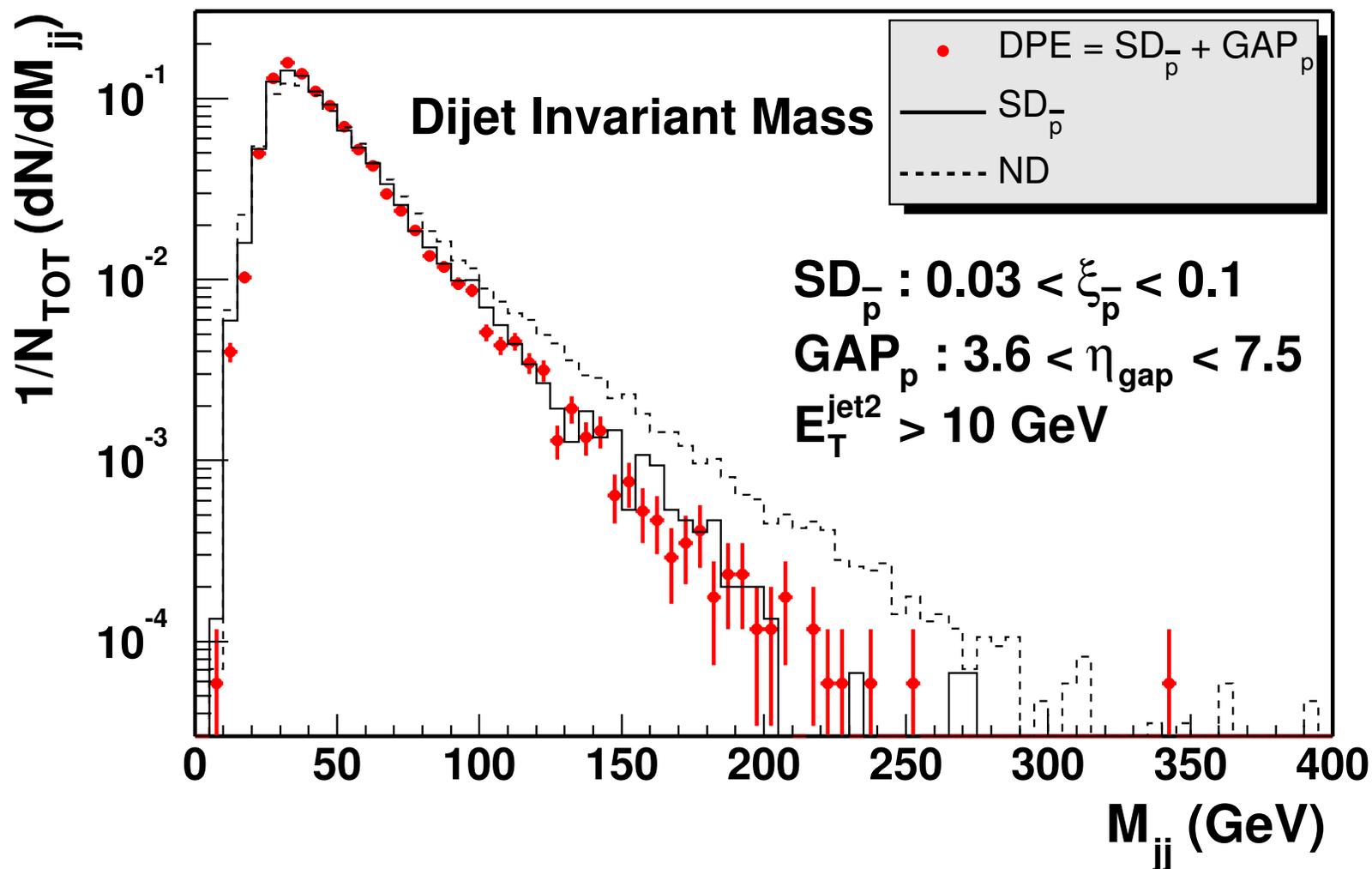
CDF Run II Preliminary



Dijet Mass

To be blessed

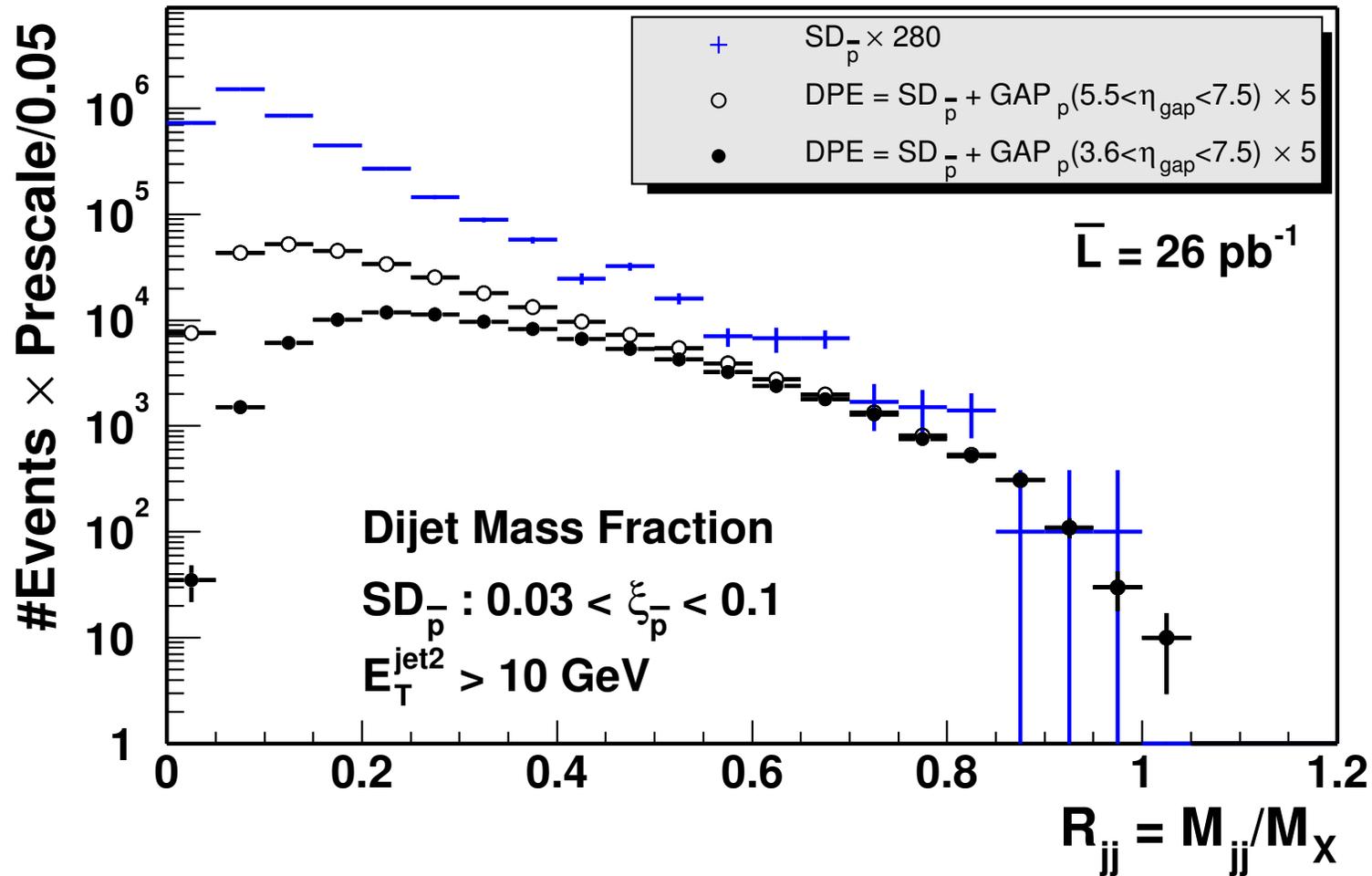
CDF Run II Preliminary



Dijet Mass Fraction - I

CDF Run II Preliminary

To be blessed



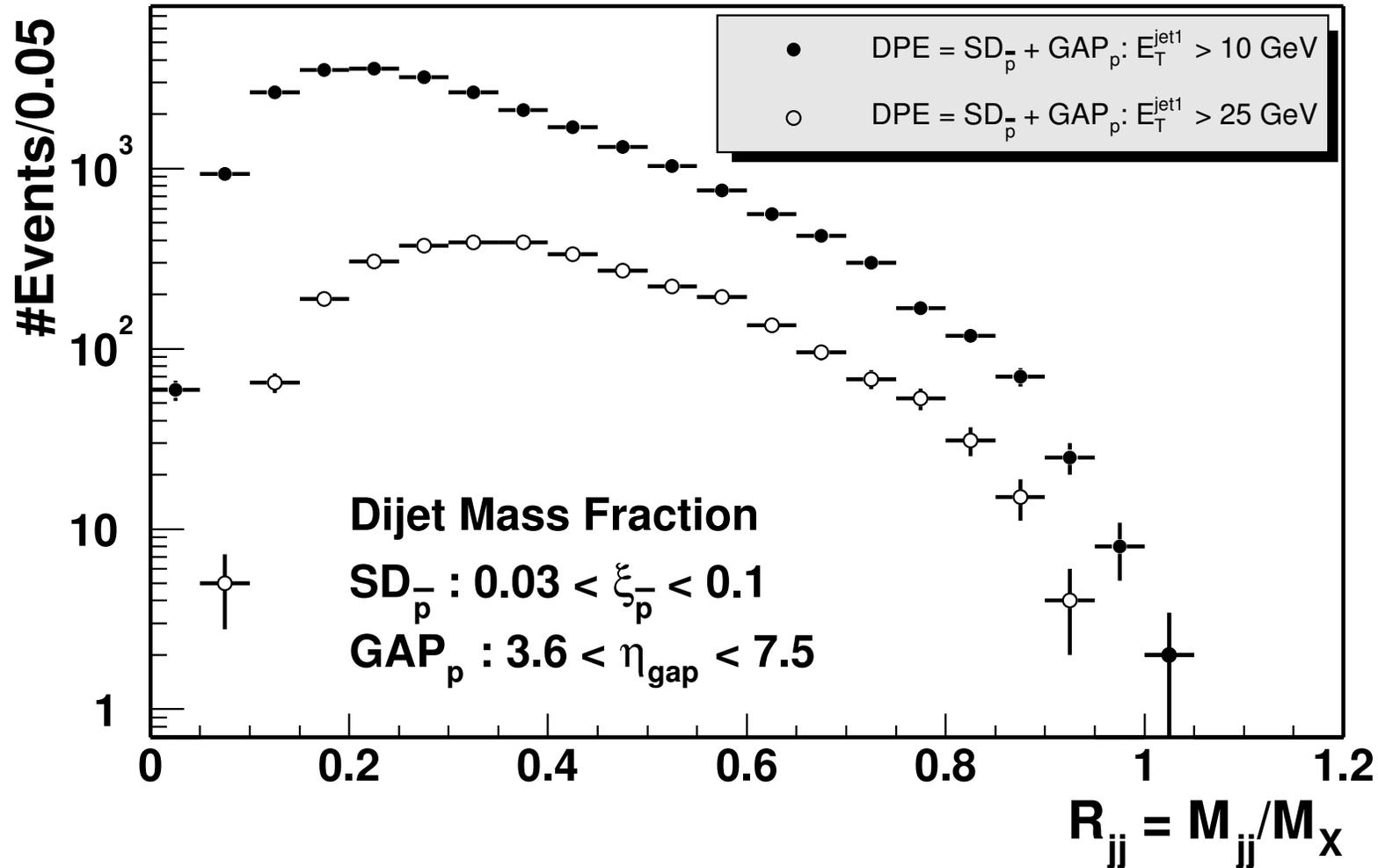
Dijet Mass Fraction: $R_{jj} = \frac{M_{jj}}{M_X}$

$$M_X = \sqrt{\xi_p \cdot \xi_{\bar{p}} \cdot s}$$

Dijet Mass Fraction - II

CDF Run II Preliminary

To be blessed



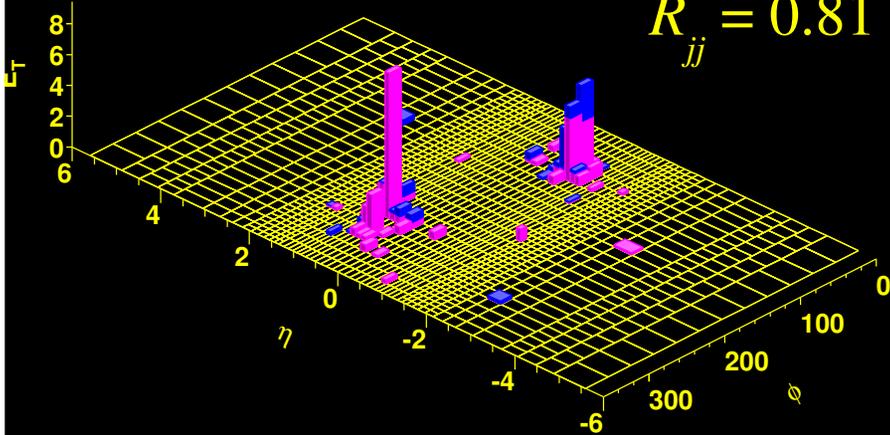
At different minimum E_T of leading jet (\rightarrow cross section)

DPE Dijet Candidates

Event : 78696 Run : 151920 EventType : DATA | Unpresc: 33,34,3,41,10,11,43,19,53,23,24,25,26,27,29,30 Presc: 33,34,10,24,25,26,27

To be blessed

$$R_{jj} = 0.81$$

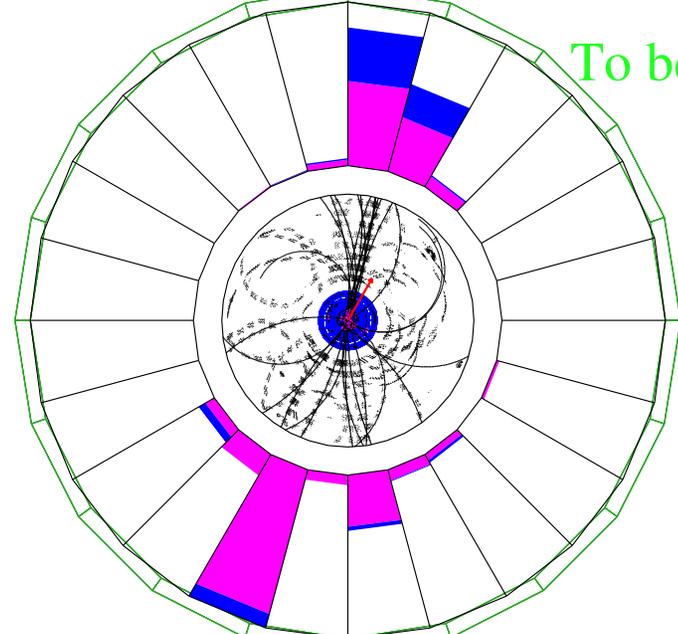


$$N_{\text{hit}}(\text{BSC}\bar{p}, \text{MP}\bar{p} : \text{BSC}p, \text{MP}p) = (0, 0 : 0, 0)$$

$$E_T^{\text{jet}1(2)} = 33 (31) \text{ GeV}, M_{jj} = 78 \text{ GeV (after energy corrected)}$$

Event : 78696 Run : 151920 EventType : DATA | Unpresc: 33,34,3,41,10,11,43,19,53,23,24,25,26,27,29,30 Presc: 33,34,10

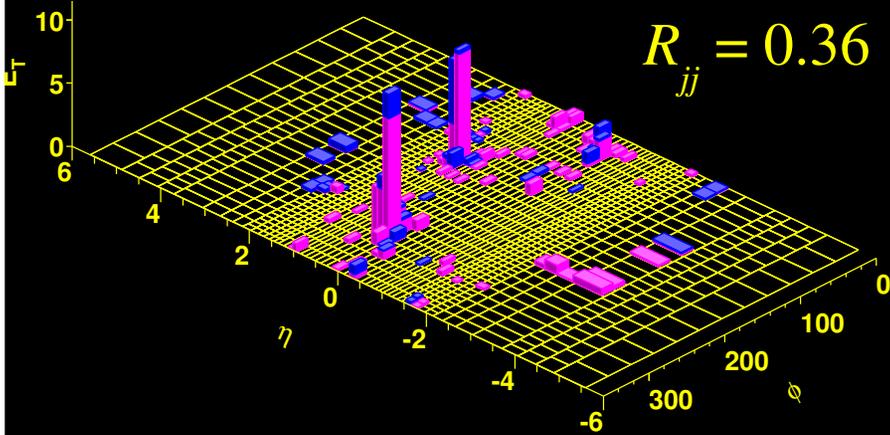
To be blessed



$$E_t = 13.75 \text{ GeV}$$

To be blessed

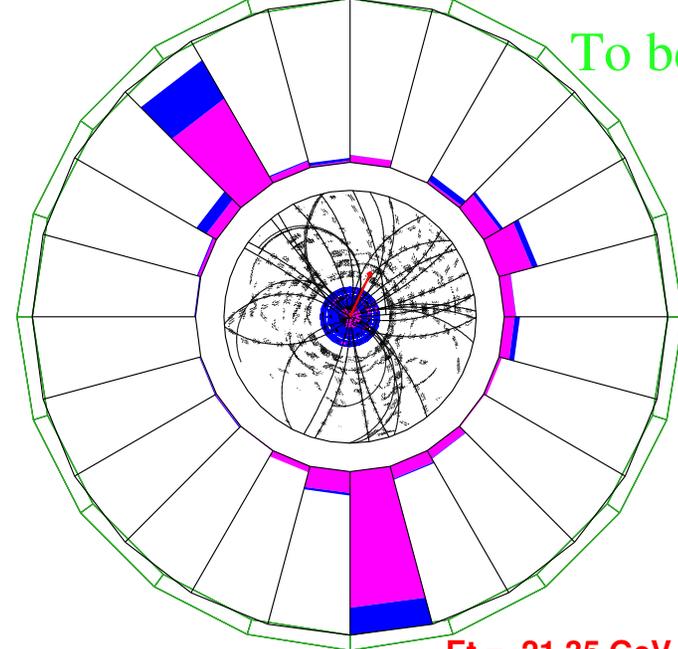
$$R_{jj} = 0.36$$



$$N_{\text{hit}}(\text{BSC}\bar{p}, \text{MP}\bar{p} : \text{BSC}p, \text{MP}p) = (0, 0 : 0, 0)$$

$$E_T^{\text{jet}1(2)} = 36 (33) \text{ GeV}, M_{jj} = 75 \text{ GeV (after energy corrected)}$$

To be blessed



$$E_t = 21.35 \text{ GeV}$$

Cross Section

$$\sigma_{DPE}^{excl. jj} = \frac{N_{DPE}(R_{jj} > 0.8)}{N_{DPE}(All)} \times \frac{N_{DPE}^{PS}}{L \cdot \epsilon \cdot A}$$

N_{DPE}^{PS} : # of observed DPE events corrected for PS \longrightarrow PS eff. study
corrected for multiple interactions

L : integrated luminosity

ϵ : trigger and vertex selection efficiencies of DPE events

A : RP acceptance ($0.03 < \xi_{\bar{p}} < 0.1$)

$\ln_{jet1,2} | < 2.5, 0.03 < \xi_{\bar{p}} < 0.1, 3.6 < \eta_{gap} < 7.5, R = 0.7$ (stat. error only)

Minimum E_T^{jet1}	Cross Section $\sigma_{DPE}^{excl. jj} (R_{jj} > 0.8)$
10 GeV	970 ± 65 pb
25 GeV	34 ± 5 pb

Summary of Systematics and Cross Sections

Source	Error on $\sigma(R_{jj} > 0.8)$
Calorimeter (Central, Plug) Energy Scale	20(22)%
Calorimeter (MiniPlug) Energy Scale	14(19)%
Roman Pot Acceptance	10%
Trigger Efficiency	5%
Multiple Interaction Correction	6%
Luminosity	6%
TOTAL	28(32)% for $E_{Tl}^{min} = 10(25)$ GeV

Note: contribution from UE energy error ($\pm 30\%$) $\sim 0.5\%$

To be blessed

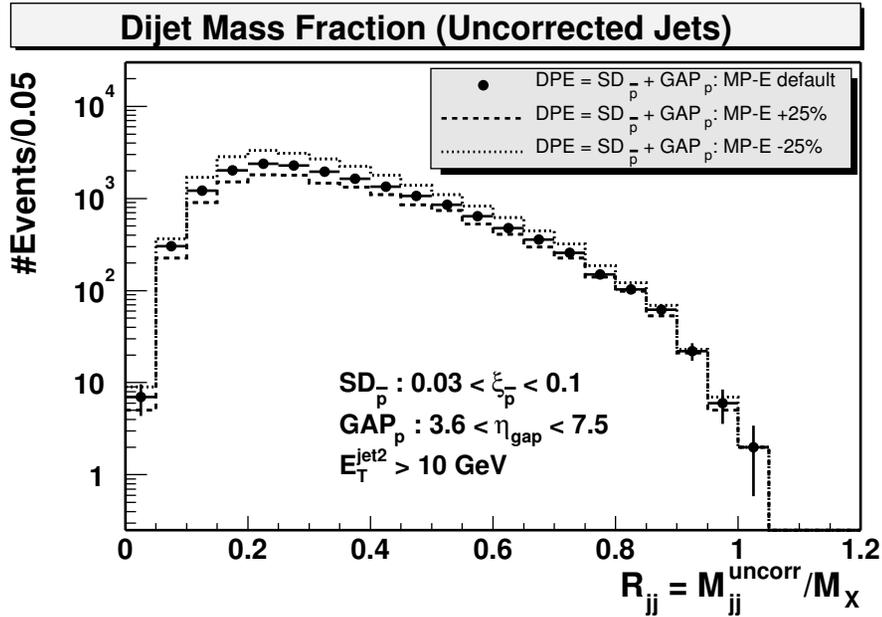
$$|\eta_{jet1,2}| < 2.5, 0.03 < \xi_{\bar{p}} < 0.1, 3.6 < \eta_{gap} < 7.5, R = 0.7$$

Minimum E_T^{jet1}	Cross Section : $\sigma_{DPE}^{excl. jj} (R_{jj} > 0.8)$
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10 GeV	$970 \pm 65(\text{stat}) \pm 272(\text{syst})$ pb
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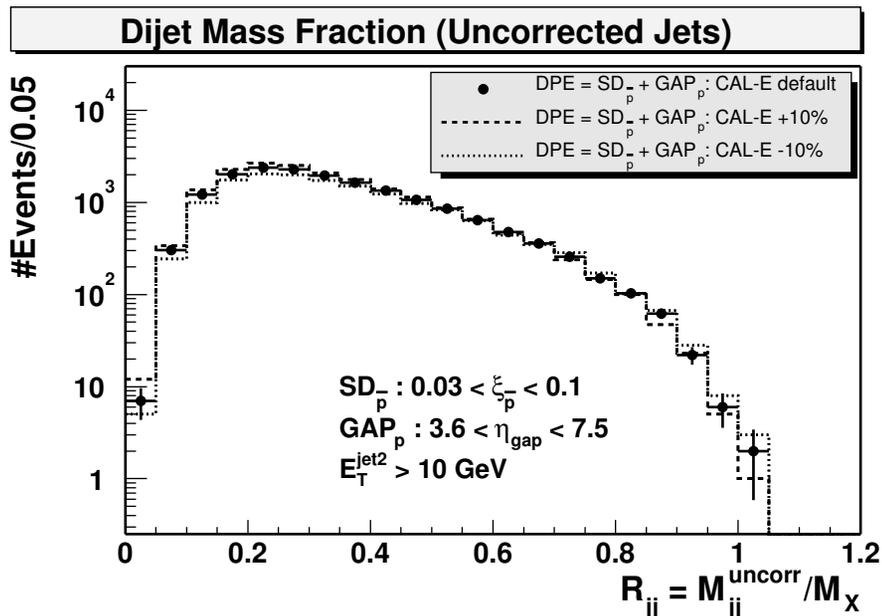
25 GeV	$34 \pm 5(\text{stat}) \pm 10(\text{syst})$ pb
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Systematic Uncertainty: Cal. Energy Scale



At $E_T^{jet1} > 10 \text{ GeV}$,

- ✓ 25% change of MP scale
 → variation of $\sigma(R_{jj} > 0.8) < \pm 14\%$
- ✓ 10% change of Central+Plug scale
 → variation of $\sigma(R_{jj} > 0.8) < \pm 25\%$



Evaluated at different minimum E_t^{jet1}